

REMARKS

The Examiner's finding that Claims 24 and 25 contain allowable subject matter is gratefully acknowledged. However, Applicant believes that all other pending claims are also allowable, as will be explained below. Claims 13 through 20 and 31 through 35 have been canceled without disclaimer or prejudice; Claims 1 through 12, 21 through 30, and 36 through 38 remain pending in the application.

Paragraph [0054] has been amended to correct a minor editorial error, correcting one occurrence of the name of the layer with the reference number 12".

Claim Rejections – 35 USC § 102

Kurtz

In Section 1 of the Office Action, the Examiner rejected Claims 1-3, and 9-11 as being anticipated by Kurtz *et al.* (US 5,543,349, hereinafter "Kurtz"). The Examiner asserts that the method disclosed by Kurtz includes "providing a coating 26 (oxide) on a first portion of the first layer 28 ... bonding by fusion bonding the first layer and the second layer to each other to form a beam/micromachined device..., the coating being effective to *prevent* the coated portion from bonding with the second layer (fig. 8)" (Office Action of 10/22/2008, Section 1, *emphasis added*).

However, contrary to the assertion of the Examiner, the coating 26 *does not* prevent the coated portion from bonding with the second layer. In fact, the complete opposite is true. As will be appreciated by a careful examination of Figs. 7 and 8, the *only* portions of the first layer that are bonded to the second layer are the *coated* portions.

As described in Col. 4, line 59 through Col. 5, line 40, the pressure sensor of Kurtz is formed, in pertinent part by bonding two wafers together. The first wafer, designated wafer 20, is etched to form a series of shallow depressions 24 (col. 5, lines 8-10). An oxide layer 26 is applied to the wafer 20 (seen in Fig. 4), and selectively removed from the bottom of each depression 24 (seen in Fig. 5) (Col. 5, lines 10-15). A second wafer 28 has a layer 30 formed on it. (Col. 5, lines 16-19). Then, according

to Kurtz, “the second wafer 28 is then *bonded to the first wafer 20...as shown in Fig. 7.*” (Col. 5, lines 26-27, *emphasis added*). It will be apparent upon inspection of Fig. 7 that the second wafer 28 can *only* be *bonded* to the coated portions of the first wafer 20, that is, the portions of the first wafer 20 from which the oxide layer 26 is *present*, as there is no other location shown in Fig. 7 for physical attachment between the layers. There can be no bonding in the area where the oxide layer 26 is removed; the oxide layer 26 is removed at the bottom of the depressions 24, where the first wafer 20 and the second wafer 28 are physically separated, and clearly not bonded..

The Examiner has clearly misunderstood the teaching of Kurtz. Accordingly, the rejections of pending Claims 1-3, and 9-11 that are based in whole or in part upon Kurtz should be withdrawn.

Neukermans

In Section 2 of the Office Action, the Examiner rejected Claims 1, and 4-8 as being anticipated by Neukermans *et al.* (US 6,224,445, hereinafter “Neukermans”). The Examiner asserts that the method disclosed by Neukermans includes “providing a first layer of material 28, providing a second layer of material 44, providing a coating 66 on a first portion of the first layer 28...., bonding by the first layer and the second layer to each other to form a micromachined device...., the coating being effective to *prevent* the coated portion from bonding to the second layer.” (Office Action of 10/22/2008, Section 2, *emphasis added*).

However, contrary to the assertion of the Examiner, the coating 66 *does not* prevent the coated portion from bonding with the second layer. In fact, the complete opposite is true. As will be appreciated by a careful examination of Figs. 4A and 4B, the *only* portions of the first layer that are bonded to the second layer are the *coated* portions.

As described in Col. 8, line 45 through Col. 9, line 36, the device of Neukermans is formed, in pertinent part by bonding a wafer 42 to a silicon substrate forming a faceplate 28 (Col. 8, lines 45-48). “To produce a vacuum tight bond

between the face plate 28 and the lower layer 46 of the SOI wafer 42, a thin foil 66 ... is placed between the face plate 28 and the SOI wafer 42, a weight is then placed on the upper layer 44 of the SOI wafer 42, and the sandwich thus assembled heated... above the eutectic temperature of a silicon-aluminum (about 550 C.), and then cooled. Because pure aluminum and silicon inter-diffuse aggressively, bonds can be achieved at temperatures as low as 450° C. ” (Col. 8, line 65 – Col. 9, line 8). Finally, it is noted that, “*The use of a foil 66 made from gold or gold-germanium only requires a temperature of approximately 450° C. for bonding the SOI wafer 42 to the face plate 28.*” (Col. 9, lines 33 – 36).

It will be apparent upon inspection of Fig. 4A and Fig. 4B that the face plate 28 can *only be bonded* to the portions of the wafer 42 where the foil 66 forms an interposing coating, as there is no other location shown in either figure for physical attachment between the components. There can be no bonding in the area where the foil 66 is not present, as there is no abutment of the wafer 42 and the face plate 28 in other locations.

The Examiner has clearly misunderstood the teaching of Neukermans. Accordingly, the rejections of pending Claims 1, and 4-8 that are based in whole or in part upon Neukermans should be withdrawn.

Section 3 of the Office Action deals with the Examiner's rejection of Claims 13 - 19, which Claims are, by this Amendment, canceled without prejudice or disclaimer. Accordingly, these rejections are moot, and need not be discussed further.

Shinohara

In Section 4 of the Office Action, the Examiner rejected Claims 21 - 23, and 26 - 29 as being anticipated by Shinohara *et al.* (US 6,724,718, hereinafter “Shinohara”).

Initially, it is noted that Shinohara describes a method of making an optical head, and thus is not relevant prior art with respect to Claims 21 - 23 and 26, which are directed to manufacture of a microvalve. The Examiner attempts to make Shinohara appear relevant by re-naming parts of the Shinohara optical head with names drawn

from Applicant's claims (e.g., " the first layer includes a slider part 7001/movable microvalve portion"; and " positioning the coated portion of the second layer adjacent to the movable microvalve portion of the first layer 7001"), the fact remains that the "slider part 7001" (as it is labeled in Shinohara) is merely a body through which light shines, and which moves (slides) above a recording medium. It does not function as a microvalve, or a part thereof, and to mischaracterize the device of Shinohara as a microvalve would be a mistake.

Furthermore, in attempting to arrive at the elements of Applicant's Claim 21, the Examiner has taken elements of a teaching about the seventh embodiment of Shinohara as providing one element of Applicant's Claim 21 (citing text at col.1 17, lines 1-5), and improperly combined this with a teaching about the tenth embodiment of Shinohara (citing text at col. 18, lines 25-30). The text at col. 18, lines 25 - 30 relate to a method of cutting the waveguide 10903 and mirror part 10002 with a blade 600 to achieve the particular geometry of the tenth embodiment shown in Fig. 16, which is not the same as, and not relevant to the geometry of waveguide 7903 and mirror part 7002 of the seventh embodiment.

All the above indicate that the Examiner has clearly misunderstood the teaching of Shinohara. Accordingly, the rejections of pending Claims 21 - 23 and 26 that are based in whole or in part upon Shinohara should be withdrawn.

Sections 5, 6, and 7 of the Office Action deals with the Examiner's rejections of Claims 31, 32, and 33-34, respectively, which claims are, by this Amendment, canceled without prejudice or disclaimer. Accordingly, these rejections are moot, and need not be discussed further.

In section 8 of the Office Action, the Examiner rejected Claims 36 and 37 as being anticipated by Shinohara. Again, the Examiner has misunderstood the teaching of Shinohara. For example, the Examiner asserts that Shinohara teaches, " providing a plurality of layers of material, including a first layer 7001 and a second layer 7002 (col 17, lines 1-5; fig. 10) ... etching the *first layer* to form a portion of a micromachined device *including a slider portion and a layer portion such that the slider portion is*

movable relative to the layer portion, the slider portion substantially corresponds to the size and shape of the coating portion (col 11, lines 20-30, fig. 10)" (Office Action, Page 11).

However, contrary to the Examiner's assertion, the "layer" (slider part) 7001 of Shinohara is a component in which all portions thereof are in fixed relation to one another. As indicated in the sentence beginning on line 66 of col. 16 of Shinohara, "the construction of the near-field optical head 7000 is approximately the same as that of the near-field optical head shown in the sixth embodiment", which, as indicated in the sentence beginning on line 2 of col. 16 of Shinohara, "[t]he slider part 6001 has the same construction as the slider part 2001 of the second embodiment of the present invention.". As indicated in the sentence beginning on line 21 of col. 13 of Shinohara, "[t]he construction of the near-field optical head 2000 is approximately the same as that of the first embodiment of the present invention. Different point lies in the geometry of the mirror 2002." Thus the construction of the slider part 7001 is similar to that of the slider part 1001 of the first embodiment, which, as can be clearly seen in Fig. 2(b), is a single solid component with a hole and a v-shaped groove formed therein. There is no portion of the slider part 1001 that is movable relative to another portion of the slider part 1001; by extension, there is no portion of the slider part 7001 that is movable relative to another portion of the slider part 7001.

Furthermore, lines 20-30 of col. 11 read as follows, " FIG. 4f shows a accumulating process of a reflection coating, in which is illustrated a condition that the reflection coating 106 has already been accumulated. After the V-shaped groove is formed, the masking 105 and the masking 104 on the rear face of the substrate 103 are removed by wet etching or by dry etching. Subsequently, the substrate 104 is accumulated with a metal having a high reflection factor and shading factor such as aluminum or gold by means of sputtering or vacuum deposition method. Then, taking the advantage of the simultaneous accumulation of the reflection coating 106 on the circumference of the minute aperture, the size of the reflection coating 106 is adjusted

in its size." There is clearly *no* indication of etching "such that the slider portion is movable relative to the layer portion", contrary to the assertion of the Examiner.

The above are further indications that the Examiner has clearly misunderstood the teachings of Shinohara. Accordingly, the rejections of pending Claims 36 and 37 that are based in whole or in part upon Shinohara should be withdrawn.

Claim 36 has been amended, but not in response to the prior art cited by the Examiner, which is clearly irrelevant, for the reasons cited above. Claim 36 has been amended merely to make minor editorial changes, to clarify the language of the claim. Although the language of Claim 36 as originally submitted is believed to be proper, definite, and understandable by one of ordinary skill in the art, especially in light of the teaching of the Specification, the language as amended is believed to be somewhat easier to understand. No narrowing of the scope of Claim 36 is intended or needed. Indeed, *if the Examiner believes that the accompanying amendment of Claim 36 in any way narrows the scope of Claim 36, the Examiner is requested to not amend Claim 36.*

Claim Rejections – 35 USC § 103

Kurtz

In Section 9 of the Office Action, the Examiner rejected Claim 12 as being unpatentable over Kurtz in light of Ting (US 5,856,705, hereinafter "Ting"). Claim 12 depends from Claim 1. As indicated above, the Examiner has clearly misunderstood the teaching of Kurtz, and, as such, the rejection of pending Claim 12 in Section 9 which is based in part on Kurtz should be withdrawn. Furthermore, the coating in Ting, "is used for passivation layer" (Ting, col. 4, line 3), not as a "coating to prevent the coated portion from bonding", as recited in Claim 1, upon which Claim 12 is based. The thickness of a coating provided for an *entirely unrelated purpose* is completely irrelevant. To take the teaching of the cited section of Ting, which deals with a "process for passivation of [*exposed* dielectric layers and the bonding pads] of semiconductor devices to protect those devices from environmental moisture or contamination" (Ting, col. 3, lines 31 - 37) and suggest that there is any relevance to a

process in which an internal coating is used between layers of a micromachined device to prevent bonding between portions of the layers would therefore seems to be without any legitimate motivation, since the use of hindsight to assemble elements of Applicants' claims from unrelated references is inappropriate.. Thus, it appears that the Examiner must have misunderstood the teachings of Ting as well as the teachings of Kurtz. Accordingly, the rejection of pending Claim 12 in Section 9 which is based in part on either Kurtz or Ting should be withdrawn.

Neukermans

In Section 10 of the Office Action, the Examiner rejected Claim 20 as being unpatentable over Neukermans in light of Ting.

As discussed above, the Examiner has misunderstood or misapplied the teachings of both Neukermans and Ting. Accordingly, the rejection of pending Claim 20 in Section 10 which is based in part on either Neukermans or Ting should be withdrawn.

The application should now be in proper form for allowance, and a Notice of Allowance is respectfully requested. *If, for any reason, the Examiner cannot issue a Notice of Allowance following entry of this Amendment*, the Examiner is respectfully requested to contact the undersigned attorney to arrange an interview to discuss the reason(s), in order that the application be most expeditiously handled.

Respectfully submitted,

/Allen W. Inks/
Allen W. Inks
Reg. No. 37,358

MacMillan, Sobanski & Todd, LLC
One Maritime Plaza, Fifth Floor
720 Water Street
Toledo, Ohio 43604
(419) 255-5900
inks@mstfirm.com